## TCT-678

### Comparative Study in Two Institutions Between IVUS and Pressure Wire in the Assessment of Intermediate Lesions

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**Background:** The assessment of intermediate coronary lesions can be done with IVUS or pressure-wire derived fractional flow reserve (FFR). Both have their advantages and limitations. There are not randomized trials comparing these strategies. There are small registries from the same center but subjected to important biases.
**Methods:** In two public institutions the strategy for intermediate lesion evaluation has been different in previous years, in one was based in IVUS (IVUS Center) and in the other was based in FFR (FFR Center). We have compared the outcome of patients with intermediate lesions (40-60%) assessed in a 4 years period (2006-2009) in both centers. The criteria for revascularization was FFR <0.75 and a minimum lumen area <4mm2 in vessels >3 mm and <3.5 mm2 in vessels 2.5-3 mm.
**Results:** In the FFR center 471 patients were included (545 lesions studied). After FFR measurement, 364 (67%) lesions were left untreated in 321 patients. In the IVUS center 352 pts were included (429 lesions studied). After IVUS examination, 228 (53%) lesions were left untreated in 182 pts (p=0.0001 vs FFR center). The clinical and angiographic profile of both groups was well balanced without significant differences. In the FFR-deferred group at 12 months there were 3 cardiac deaths (not lesion related), none lesion related infarctions and 7 (1.9%) target lesions were treated in 7 (2.1%) pts. In 8 pts revascularization was done in other lesions and in 3 pts over a restenotic lesion. In the IVUS-deferred group at 12 months there were 2 cardiac deaths (not lesion related), none lesion related infarctions and 2 (0.9%) target lesions were treated in 2 (1%) pts (p=0.5 vs FFR center). In 5 patients revascularization was done in new lesions and in other 5 pts over a restenotic lesion.
**Conclusion:** The assessment of intermediate lesions with IVUS induce a higher degree of revascularization (47% vs 33%). At one year follow up both strategies result safe with a very low rate of lesion-related events, only a 1-2% of revascularizations.

## TCT-679

### The Relationship Between Long-term Clinical Outcomes and Serial Atheroma Changes by Volumetric Intravascular Ultrasound

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**Background:** Intravascular ultrasound (IVUS) is widely used as an endpoint in studies aimed at reducing progression or regression of coronary artery disease. However, the relationship between long-term clinical outcomes and serial atheroma changes by IVUS remains unclear.
**Methods:** Serial volumetric IVUS examinations (baseline and 14 months) were performed in 338 stable angina pectoris patients with native coronary artery lesions. When these patients underwent percutaneous coronary intervention for culprit lesions, IVUS was also performed in their non-culprit vessels (without angiographically documented coronary stenosis [<50%]). We compared 4-year clinical outcomes, including major adverse cardio- and cerebrovascular events (MACCE), and annual progression rate of atherosclerosis, assessed by serial volumetric IVUS (mean lengths: 43mm).
**Results:** The 4-year cumulative rate of MACCE was 21.3%. Coronary events were adjudicated to be related to culprit lesions in 10.4% of patients and to non-culprit lesions in 8.9%. By adjusting for validated prognosticators, diabetes (baseline HbA1c>7.5%), prior history of cardiovascular disease, high age (>70 years), 3-vessel disease, and large annual atheroma progression (atheroma volume >15% / year) were identified as poor predictors of MACCE, whereas Statin and ARB/ACE administration were identified as good predictors. Additionally, patients with adverse events (n=62) had larger annual atheroma progression than the rest of the population (23.8±18.7% vs. 2.1±13.8%, P<0.001).

| Variables | Hazard Ratio | 95%CI | p-value |
|---|---|---|---|
| Age >70 | 2.85 | 0.69-6.01 | 0.11 |
| ARB or ACEs | 0.84 | 0.64-1.04 | 0.07 |
| Statins | 0.76 | 0.45-0.89 | 0.02 |
| Prior History of Coronary Disease | 2.25 | 0.71-3.27 | 0.14 |
| Atheroma volume >15% / year | 1.91 | 1.04-2.88 | 0.03 |
| Three-Vessel disease | 3.41 | 1.58-6.72 | <0.01 |
| Baseline HbA1c > 7.5% | 3.08 | 1.33-5.14 | <0.01 |

**Conclusion:** Atheroma volume changes, assessed by volumetric IVUS, seem to be a reliable surrogate for future major adverse cardio- and cerebrovascular events in this study cohort.

## TCT-680

### Extent, Characterization, and Clinical Implications of Untreated Lesions with High Plaque Burden after Successful Percutaneous Coronary Intervention: A PROSPECT Substudy

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**Background:** In patients (pts) with acute coronary syndromes (ACS), residual atherosclerotic disease after successful percutaneous coronary intervention (PCI) may predispose to future major adverse cardiovascular events (MACE).
**Methods:** In PROSPECT, following successful PCI of all clinically significant lesions in pts with ACS, three-vessel gray-scale and radiofrequency-intravascular ultrasound (IVUS) was performed. Analyzable images were available in 660 pts, followed for a median of 3.4 years.
**Results:** Total plaque burden was 49.6 ± 4.2% in imaged segments. At least one lesion with a plaque burden ≥70% (PB70) was found in 220 (33%) patients. History of PCI (OR 1.79 [1.07, 2.99]) and angiographic three-vessel disease (1.77 [1.24, 2.52]) were independent predictors of pts with PB70 lesions. IVUS findings and clinical outcomes are shown in the Table. Among imaged nonculprit lesions, the proportion of PB70 lesions causing clinical events was significantly greater than non-PB70 lesions (8.7% vs. 1.0%, p <0.0001).

**Baseline Imaging and 3-Year Outcomes in Patients with and without PB70 Lesions**

| | With PB70 | Without PB70 | Hazard Ratio | P |
|---|---|---|---|---|
| Plaque volume (%) | 52.1 | 47.9 | N/A | <0.0001 |
| Plaque burden (mm3/mm) | 8.41 | 7.78 | N/A | <0.0001 |
| Fibroatheromas (n) | 3.28 ± 1.89 | 2.63 ± 1.89 | N/A | <0.0001 |
| Thin-capped fibroatheromas (n) | 1.24 ± 1.42 | 0.96 ± 1.34 | N/A | 0.005 |
| Necrotic core (mm3/mm) | 0.66 | 0.46 | N/A | <0.0001 |
| Dense calcium (mm3/mm) | 0.28 | 0.19 | N/A | <0.0001 |
| Non Culprit Lesion MACE | With PB70 (%) | Without PB70 (%) | Hazard Ratio | P |
| Death | 0.0 | 0.0 | N/A | N/A |
| MI | 1.6 | 0.8 | 1.96 [0.40, 9.73] | 0.40 |
| Rehospitalization | 19.3 | 7.2 | 2.81 [1.74, 4.54] | <0.0001 |
| Revascularization | 18.8 | 7.2 | 2.74 [1.69, 4.44] | <0.0001 |
| Composite MACE | 20.8 | 7.7 | 2.85 [1.79, 4.53] | <0.0001 |

**Conclusion:** Following successful PCI of all angiographically significant lesions, overall atherosclerotic burden is high and PB70 lesions are frequently present in the proximal and mid-coronary tree. Pts with PB70 lesions have a greater disease burden and are at increased risk for future MACE.

## TCT-681

### Volumetric Intravascular Ultrasound Assessment Of Mechanisms and Results Of Stent Expansion In Heart Transplant Patients

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**Background:** We investigated mechanisms and potential differences in stent expansion among transplant patients vs. patients with native coronary artery atherosclerotic disease ("controls").
**Methods:** We compared pre and post-stent intravascular ultrasound in 12 transplant patients (17 lesions) and 33 control patients (34 lesions) matched according to age (60.1±9.2 years), diabetes mellitus, and lesion location. Planar and volumetric analysis was conducted for every 1 mm at the lesion site as well as the first 5 mm proximal and distal to the stent edge. Focal stent expansion was defined as minimum stent area (MSA) divided by mean reference lumen area. Diffuse stent expansion was defined as mean stent area divided by mean reference lumen area.
**Results:** Transplant patients had more plaque than "controls" pre-stenting, but similar MSA and focal and diffuse stent expansion afterwards. The increase in mean lumen area correlated with the increase in mean vessel area in both groups - transplant (R=0.64, p=0.008) and controls (R=0.70, p<0.0001), but correlated inversely with changes in mean plaque area only in the transplant group (R=0.55, p=0.027) – Fig 1. There were no differences in calcification between the two groups and no axial plaque distribution from the lesion into the reference segments in either group.